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Computing
WEEKLY
9 September 1982 Vol 1 No 21
35p
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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long

All submissions should be typed and a double space should be left between each line

Programs should, whenever possible be computer printed.

At present we cannot guarantee to return every submitted article so please keep a copy

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work.

This Week



Cover illustration by Ian Craig

Editorial

The Jupiter Ace launched last month, is a new kind of low cost micro. Designed by Richard Altwasser and Steve Vickers, the team responsible for Sinclair's ZX Spectrum the Jupiter Ace consists of a Z80A microprocessor complete with 8K Rom, 3K Ram and 32 × 24 display

But, while the hardware is fairly standard, the software is decidedly different. The Jupiter Ace is the first micro to use Forth Almost every other micro on the market uses some form of Basic

Forth was Invented by Charles Moore and Elizabeth Rather at the US National Radio Astronomy Observatory in the early 1970s It is much faster than Basic and takes up far less memory Supporters of Forth also claim it is easier to learn than Basic

Calculator enthusiasts, who should be familiar with Reverse Polish Notation, will find little difficulty in coming to grips with the Jupiter Ace Micro users, who have already learnt to program in Basic, may find it harder to deal with Forth

Whatever your views on Forth, Altwasser and Vickers should be congratulated for trying something new I just wish the Jupiter Ace was colour instead of black and white

Next Week



Can you save your city from the mutant bees? Find out in Swarm, a new game for Spectrum.

Christmas launch for Commodore Max

THE new Commodore Max is to be launched in the UK just before Christmas

Features will include a 66-key keyboard, complete with four programmable function keys, direct audio and video output and a built-in RF modulator. Twin control ports will allow the use of two joysticks, four paddles or a lightpen

There is a cartridge slot for games. The Max cartridges will be compatible with the Commodore 64 (reviewed in *Popular Computing Weekly*, September 2)

A mini Basic cartridge option will enable users to write their own programs

The Commodore Max (formerly called the Vic10 and the Ultimax) has 2K internal memory and a 40 column × 25 line display. There are 16 colours, which can be used simultaneously on-screen. Graphics resolution is 320 × 200 pixels

Commodore Max

The Max's sound consists of three independent voices of nine octaves each. There is an envelope generator, a programmable filter and master resonance and volume controls

The Commodore Max will have a recommended retail price of £110 including VAT

Panasonic to launch handheld computer in UK

PANASONIC is to launch the RL-H1000 hand held computer in the UK next spring

The primary unit of the system is based around a 6502 processor with 16K Rom and either 4K or 8K Ram. It also features a built-in 26 character liquid crystal display

The main advantage of the microcomputer is its size. The primary unit is 9in × 2½in × 3¼in and weighs just over 1¼lb

It is powered by five nickel cadmium rechargable batteries. Mains operation is also possible using an AC adaptor

The range of peripherals that will be available with the machine includes I/O adaptor, RS232C interface, acoustic modem, tv adaptor and a programmable memory expansion protected by its own back-up battery

All of these accessories, together with the primary unit can be fitted inside a specially converted attache case

The RL-H1000 hand held computer has been on sale in the US since January this year. Current American prices for the primary unit are £225 and £280 for the 4K and 8K versions with peripherals costing between £60 and £200

Panasonic's handheld micro

Prestel to give away free adaptors

PRESTEL hopes to give away 100,000 free adaptors, to encourage more home tv owners to use its services. The scheme, which is known as Project Y, will be carried out in collaboration with an unnamed financial institution

The Prestel adaptors will be offered to the institution's existing customers as part of a package deal

The age of the game

IT is now possible to annihilate space invaders between London and Scotland

In an experiment being conducted by British Rail, selected trains from Euston to Inverness will carry a Space Invaders machine along with the sandwiches in the buffet car

The machines have been supplied by Bell Fruit (UK) Ltd and have been installed with the help of area maintenance staff at British Rail's Derby engineering works

Introduction of the machines was the idea of Peter Dunkerley, a member of BR's Transport Technology Assessment Group. He says "We investigate all kinds of new technology which may be adapted to increase BR's passenger and freight revenue. The Space Invaders project started following a brainstorming session"

If the scheme is successful the idea may be extended to other long-distance services

Aliens from Inverness

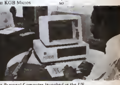
Speculation over IBM's Greenock plant

THERE is increasing speculation that IBM's Personal Computer will be produced at its Greenock plant in Scotland

The IBM Personal Computer, which costs £888, was launched in the US in August 1981. It has yet to be released in the UK, though a limited number of machines have been imported by companies such as KGB Micros

However, an IBM spokesman said "There has been considerable speculation over many months about the possibility of an announcement of the IBM Personal Computer in Europe, including its place of manufacture

"We have consistently refused to comment on such speculation and continue to do so"



IBM's Personal Computer launched in the US

Lynx micro from Camputers

THE Lynx, a new micro from Cambridge-based Camputers Ltd, will be shown publicly for the first time at the *Personal Computer World* show in September

The new micro will cost £150 plus VAT. It includes 48K Ram, an integral power supply and a typewriter-style keyboard. Other features include high resolution colour graphics and a built-in speaker

A complete Lynx system, with disc drives and printer, will be on display at the Lynx stand — No 269 — from September 9-12

More information from Camputers Ltd, 36a Hills Road, Cambridge CB2 1LA





• 4 Spectrum tapes

Popular Computing Weekly has negotiated a special discount offer on the latest Spectrum tapes from Richard Shepherd Software

• Save £1 20 on **Ship of the Line**
Our price £5 30 (List price £6 50) for the 48K version
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In the massive 48K version of this popular adventure game you have to use your skill and cunning to be promoted from a Midshipman in the Queen's Navy, to First Sea Lord. Can you lead a boarding party? Can you aim your guns? Can you bribe the selection panel when you fail the intelligence test?

• Save £1 00 on **Fruit Machine and Submarine**
Our price £3 95 (List price £4 95)
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• Save £1 50 on **Cash Control**
Our price £8 50 (List price £10 00)
This is a comprehensive 48K cash control program. It covers everything from calculating your mortgage to controlling your bank balance and everyday expenditure. It is well cross-referenced and easy to use

• Save £0 70 on **Monster Mine**
Our price £4 25 (List price £4 95)
This high quality game for the 16K or 48K Spectrum is written in machine code and is fast. You have to manoeuvre and climb out of a mine-shaft picking up nuggets of gold on the way. All the time you have to move fast to avoid being eaten by the monsters chasing you

To have these top cassettes sent to your home all you have to do is fill in the form below and send it to *Popular Computing Weekly*

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Letters

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Riding the gravy train

I enjoyed Jeremy Ruston's "Voyager" program in the July 22 issue, but the message "You missed — see you in 30 light years" is bad enough to be a quote from *Star Wars*. As anyone who has ever picked up a physics text book (or watched *Star Trek* for that matter) could tell you, a light year is a measurement of distance.

Also, why our frozen food should go off because we went fast is beyond me. Might I suggest that the fuel ran out first.

I also enjoyed Reverse by Mike Berry. I hope you can continue the standard.

Peter Greenall
Leicester

Or hitching with the dragon?

It surprised me after reading your review of the Dragon 32 and associated comments and letters from your readers, that no one has spotted one essential fact. The Dragon is not only in direct competition with the Tandy Colour Computer, it also consists of exactly the same technology, with very few exceptions.

The 16K extended Microsoft Basic, with its special commands for 256x192 graphics and one channel sound, is to *the byte* the same as used on the pre-existing Tandy. The low quality screen display and Rom port are also reminders of that machine.

I owned a Colour Computer for some eleven months and found it to be under supported and of low quality components — clickity-clackity keyboard and on parallel port. When I moved here from the US, I sold it at a loss and chose what to me seemed to be a high quality machine with future options for expansion — the BBC model B. Now I see that the ghost of my former computer, albeit with a fairly good keyboard and Centronics port, has followed me over the Atlantic.

PS if the Rom port is the same as the Tandy, and I see no reason why it would not be, then Dragon owners will find there is a ready bank of software at their nearest Tandy dealer.

William Barnes
5 Shaftesbury Villas
Allen Street
London W8

Spectrum bugs wanted

Paul Harrison in this column (August 12) reported a 'bug' in his Spectrum — well, all of the presently available machines have it and more!

Paul noticed that if the 'cursor-line' was set to 'one after' the last line of a program then the edit key give an edit-line containing a 'cursor'. His example was to enter:

```
100 PRINT — ENTER
101       — ENTER
EDIT
```

and line 100 would be brought down with the 'cursor' (but not when using 255 and 256). So what is happening?

In the above case, the 'cursor line' is 100 when the first *Enter* is keyed. It becomes 101 when the second *Enter* is keyed but when *Edit* is used there is no line 101 and the last line of the program, ie 100, is called down.

Now for the problem. The programmer of the Rom decided that *Edit* lines shall not have a 'cursor'. He says that before printing an *Edit* line the system variable *E-PPC*, that holds the cursor line number, will be decremented — but he forgot that the last line of the program might have a line number that is 'E-PPC — 1'. Hence on those special occasions a 'cursor' is printed.

The solution is probably quite simple — change the instruction line at *OFDE h* from *Call* 1855 to *Call* 1860.

And for two further bugs. Try replying to *'scroll?'* with *'caps lock'*, *'graphics'*, or *'shift & symbol shift'*. The results are interesting and it is most surprising that the Spectrum does not crash.

The other bug is to ponder over why *'Int — 65536 = — 1'*.

No doubt other 'bugs' will appear and I would very much like to hear about them.

Ian Logan
24 Nurses Lane
Skellingthorpe
Lincoln LN6 5TT

Time gentlemen —please

My Spectrum has been on order from Sinclair for eight weeks now. Having contacted them recently I am informed that rumours of the backlog being eliminated are "greatly exaggerated". How much longer must I wait, I wonder.

When my Spectrum does arrive, however, I would like to know what amendments I will need to make to the numerous programs I have collected for the ZX81 so that they will run on the Spectrum. I have not seen this aspect of upgrading mentioned or dealt with in any magazine. Can you help?

B Davies
2 Juniper Crescent
Apsley Park
Longthorpe
Peterborough PE3 6QY

Most ZX81 Basic programs will run on the Spectrum with little or no modification. But, you will have to add your own commands to take advantage of the Spectrum's colour and sound facilities.

The simplest solution may be to use East London Robotics' Slowloader, which allows ZX81 software to run on the Spectrum. It costs about £10 and is available from East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London E6.

Cut-outs— the moaning

I am writing to make some constructive criticism, not just to complain.

I have found myself in agreement with your editorials and they have provided inspiration on many occasions. However, your editorial of July 29 exasperated me.

Motivated by a previous editorial extolling the virtues of machine code I attempted to develop my limited skills by writing a machine code program of my own. But, before I could send it off in all its glory for your hoped for approval, I read "Moonlander, Space Invader and Fruit Machine programs abound". My program was a version of Fruit Machine. Oh Well!

Having my work accepted is a great boost to my enthusiasm. Please encourage us, but be tolerant when we use an "oldie" idea to try and improve our skills. Soon, I hope, both my skills and my ideas will be increased.

Second moan. Could you print cut-out forms and competition entries on the back of advertising pages. I do not want to enter the "Spectrum" competition as it would mean losing large sections of articles that I wish to keep for future reference. Likewise your Reader Survey.

When you began you ran competitions on a theme. Could you not repeat this, perhaps on a monthly basis? Then you could print two or three of the best entries in future issues. This would give us some motivation, even if the only "prize" was possible publication.

Ray Elder
1 Penton Court
Parkhouse Road
Minehead
Somerset

We do try and print cut-out forms on the back of advertising pages, but the exigencies of production are such that it is not always possible. As for theme competitions, please write in and let us know your views.

On-screen images

After typing in the short machine code routine in the Instant screen article in July 1, I noticed that changing 3E at byte 16526 to C6 produced an inverse image of the screen. All the information in table 1 still applies to the routine.

Patrick Budden
Wolfeton
Dorchester DT2 9QN



COVER STORY

Pteragon

A new game for BBC micro by A Snell

The sudden insistent beep of the search radar alarm breaks the silence in the cockpit of the solar-powered skimmer As a newcomer to the Planetary Defence Force you tense to full alertness — this is your first mission

The recently established colony on the planet Beta Strigidae has been under attack from huge winged reptiles — the semi-sentient Pteragon Your task is to destroy the incoming waves of monsters before they reach the settlements Each member of the PDF must deal with five of the creatures in each attack and there is intense competition within the force to shoot them down in as short a time as possible

The sound of powerful wingbeats can be heard as the first of the Pteragon comes into view through your craft's forward ports, you must manoeuvre quickly to frame the monster in your sights before it flies past The 'A' and 'Z' keys move the skimmer up and down, and the '>' and '<' keys move you right and left. The space bar fires your energy beam weapon, and if you are a good shot will vaporise the Pteragon

If the Pteragon moves out of your field of view for too long, you will lose it and incur a time penalty The score shown on your display is the time taken to shoot down the number of Pteragon shown in the HITS column, plus any time penalties for missed monsters RECORD gives the fastest time achieved so far — the time that you must beat

This program has been especially written for the BBC micro and makes use of many of the advanced sound and graphics features of this machine It will run on a model B, or on a model A with 32K of memory

A look at the program listing will show that it has been written almost entirely as a set of procedures, and hence should be very easy to follow Of special interest is the simple procedure to draw the Pteragon, at line 2000 This makes use of the PLOT 86 statement, which plots using the logical inverse colour It enables the creature to move behind the foreground features on the screen by an appropriate choice of colour definitions in the initialisation procedure at line 5000

If a longer game is required the number of Pteragon to be shot down can be increased by changing the limit in line 50 The procedure called 'rules' at line 4500 has been left out of this listing to keep the length down, but can easily be written in to give a brief description of the operation of the controls before the game starts

This program has also been successfully run using joysticks on the model B Lines 550-570 are replaced by

```
550 F=ADVAL(0)
560 IF F=1 THEN PROCfire
570 IF TIME>TI+150 THEN PROCchase
```

and the procedure at line 4000 becomes

```
4000 DEF PROCchase
4010 X=X+30-INT(ADVAL(2)/900)
4020 Y=Y+30-INT(ADVAL(1)/900)
4030 ENDPROC
```



```
1 REM ***************************
2 REM *                         *
3 REM *   P T E R A G O N       *
4 REM *                         *
5 REM *   Copyright  1982       *
6 REM *      A. J. Snell        *
7 REM *                         *
8 REM ***************************
9 REM
10MODE1
20PROCinit
30PROCtitle
40PROCship
50FOR B=1 TO 5
60PROCgame
80NEXT
90PROCend
100IF G$="Y" THEN 50
110MODE7
120END
490:
499REM
500DEF PROCgame
510 X=-75:Y=200-RND(700)
520 OX=X:OY=Y:H=0:S=0
530 PROCmove
540 IF S=1 THEN 590
550 F=INKEY(0)
560 IF F<0 THEN 530
570 IF F=32 THEN PROCfire ELSE PROCchase
580 IF H=0 THEN 530
590ENDPROC
990:
999REM
1000DEF PROCship
1010 FOR T=PI/3 TO 2*PI STEP PI/3
1020 PROCfill(800,295,T,PI/36,1)
1030 PROCfill(340,256,T,PI/6,1)
1040 PROCfill(40,16,T,PI/120,2)
1050 SOUND1,[illegible],40,10:NEXT
1060 PROCfill(750,515,PI,PI/4,3)
1070 PROCfill(750,550,PI,PI/4,4,3)
1080 GCOL0,1:PRINTTAB(9,29);"SCORE     HI'S RECORD"
1090 PRINTTAB(11,31);0;     0;      ;HS;
1100 TIME=0
1110 VDU19,1,0,0,0,0
1120ENDPROC
1490:
1499REM
1500DEF PROCfill(a,b,p,q,c)
1510 GCOL0,c
1520 MOVEa*SIN(p-q),a*COS(p-q)
1530 MOVEa*SIN(p+q),a*COS(p+q)
1540 PLOT85,b*SIN(p-q),b*COS(p-q)
1550 PLOT85,b*SIN(p+q),b*COS(p+q)
1560ENDPROC
1990:
1999REM
2000DEF PROCbird(x,y)
2010 MOVEx,y:MOVEx+32,y+40
2020 PLOT86,x+56,y+28
2030 PLOT86,x+80,y+40
2040 PLOT86,x+112,y
2050ENDPROC
2490:
2499REM
2500DEF PROCmove
2510 SOUND0,-3,4,1
2520 VDU19,[illegible],0,0,0
2530 PROCbird(OX,OY)
2540 PROCbird(X,Y)
2550 SOUND0,-3,5,1
2560 OX=X:OY=Y
2570 X=X+5+RND(15):Y=Y+RND(20)
2580 IF X<-800 OR X>800 OR Y<-700 OR Y>700 THEN S=1:HS=HS+50132-TIME:PROCscore
2590ENDPROC
2990:
2999REM
3000DEF PROCfire
3010 VDU19,0,5,0,0,0
3020 SOUND1,1,150,3
3030 FOR I=1 TO 2
3040 MOVE 102,-123:MOVE-190,-96:PLOT86,0,5
3050 MOVE102,-123:MOVE190,-96:PLOT86,0,5
3060 NEXT
3070 IF POINT(0,0)=0 THEN PROChit
3080 *FX15,0
3090ENDPROC
3490:
3499REM
3500DEF PROChit
3510 SOUND0,2,6,20
3520 FOR I=15 TO 1 STEP -1
3530 PROCbird(OX,OY)
3540 VDU19,0,I,0,0,0
3550 NEXT
3560 TJ=TIME:HT=HT+1
3570 PROCscore
3580 H=1
3590 REPEAT UNTIL TIME>TJ+100
3600ENDPROC
3990:
3999REM
4000DEF PROCchase
4010 *FX15,0
4020 IF F=44 THEN X=X+36
4030 IF F=46 THEN X=X-36
4040 IF F=65 THEN Y=Y-36
4050 IF F=90 THEN Y=Y+36
4060ENDPROC
4490:
4499REM
4500DEF PROCrules
4510ENDPROC
4990:
4999REM
5000DEF PROCinit
5010 VDU5:VDU29,800,82,40,42
5020 GCOL0,1:GCOL0,130
5030 ENVELOPE1,127,0,0,0,15,0,0,127,0,0,-127,126,0
5040 ENVELOPE2,129,0,0,0,100,0,0,127,-2,0,-1,126,110
5050 VDU19,1,6,0,0,0
5060 VDU19,2,0,0,0,0
5070 VDU19,3,4,0,0,0
5080 CLG:HS=250:NS=0:HT=0
5090ENDPROC
5490:
5499REM
5500DEF PROCtitle
5510 GCOL0,2
5520 MOVE 155,260:PRINT"PTERAGON"
5530 MOVE-405,470:PRINT"Copyright 1982 A.J.Snell"
5540 PROCrules
5550ENDPROC
5990:
5999REM
6000DEF PROCscore
6010 PROCfill(750,600,PI,PI/4,4,3)
6020 GCOL0,2:SC=INT(TJ/100)+NS
6030 PRINTTAB(10,31);SC;
6040 PRINTTAB(19,31);HT;
6050 PRINTTAB(24,31);HS;
6060ENDPROC
6490:
6499REM
6500DEF PROCend
6510 REPEAT UNTIL TIME>TJ+200
6520 GCOL0,2
6530 PRINTTAB(7,30);"ANOTHER GAME ? (Y/N)"
6540 *FX15,0
6550 G$=GET$
6560 IF INSTR("YN",G$)=0 THEN 6550
6570 IF G$="N" THEN 6630
6580 PROCfill(750,530,PI,PI/4,4,3)
6590 GCOL0,2:PRINTTAB(9,29);"SCORE     HI'S RECORD"
[illegible]
6610 PRINTTAB(11,31);0;      0;      ;HS
6620 [illegible]:SC=0:NS=0:TIME=0
6630ENDPROC
```

Oversize aquatic horror fitted with remote control

***David Kelly** talks to Ulvatech about a rival to Jaws.*

If only Stephen Speilberg had known what he was starting when he filmed *Jaws*

Ever since the killer fish made its debut, the screens have been filled with a succession of sharks, whales, squids, piranha and even a deadly beach ('just when you thought it was safe to go back in the water, you can't even get across the beach').

Now *The Pike* is planned — featuring a 12 ft-long micro-controlled monster. Providing the £2.5m budget can be raised, the film should go into production later this year, for release in 1983

Work on the giant fish, controlled by an Acorn Atom, has been completed and the creature is undergoing sea trials

The huge man-eating pike has been designed and built by Ulvatech Ltd Based in Ulverston, Cumbria, the four-year old company was formed by several former employees of Vickers Oceanic

George Colquhoun, the company's managing director explained that Ulvatech specialises in underwater remote control devices and sonar equipment Its most successful product is a scanning profiler which produces sea-bed cross sections using a device incorporating a 6502 processor on the sea floor coupled to an LSI 11 surface computer

It was on the strength of this device that the Manchester-based film company, City Major, commissioned Ulvatech to build the giant pike

Building the over-size aquatic horror was not easy The basic design was produced by Ulvatech but the body of the fish was sculpted by Manchester artist Charles Wyatt

To aid in the design, two live captive pike were studied and their movements video-taped to discover the secrets of their swimming action

From the outside, the Ulvatech pike is distinguishable from the real thing only by its size

The pike has been designed to swim under its own power The tail and body of the 600lb model bend back and fore to propel it through the water The motive force comes from a pneumatic system powered by compressed air containers inside the fish

Christopher Edwards, Ulvatech's electronics expert, explained how the Acorn Atom is used to control the pike.

"We fitted one of Acorn's versatile interface boards to the Atom and used the 20mA serial output

"The micro regularly sends an eight-line data bit to each address on the pike The tail, body, rear fins front fins, jaw and eyes can all be controlled '

There are 16 possible positions for each part of the fish The control information is passed from the computer to the fish through a thin umbilical wire Of the eight data lines four are used to show the address and four are used to set the position of that address

The feedback output from each part of the pike is converted from analogue to digital It is continuously matched in a central asynchronous decoder with the corresponding input from the micro

Thus the positions of each part of the fish are updated eight times each second using information from the microcomputer

Before the pike can be made to swim the Atom generates a data table Amplitude values are then picked off this table, held in Ram by the computer, and sent to the fish to produce the swimming movements

"Obviously" said Christopher "it is a fairly unsophisticated data bank but, since each part of the fish can only register 16 positions a more accurate system was unnecessary

"We started the electronics part of the pike in January The whole fish was completed and tested in our tank in May

Since then the pike has undergone successful trials on Lake Windermere According to Christopher Edwards the fish cost about £30 000 to make

He says "It was great to work on If we were all rich we could afford to play with it to our heart's content

The giant pike is currently residing in Ulvatech's warehouse, waiting for City Major to begin filming

Errata

Jonathan Briggs is not forming a North-west London Spectrum User Group (*Popular Computing Weekly*, August 19) Please do not attempt to contact him



Joan Collins (right) examining the giant Pike (left), whose exterior skin was constructed using a special tear resistant silicon rubber reinforced with cotton muslin

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Jupiter Ace makes Forth bid for stardom



***Boris Allan** presents the first review of the new Jupiter Ace and explains its use of the language Forth*

The Jupiter Ace is a microcomputer from two leading designers of the Sinclair Spectrum (Richard Altwasser and Steve Vickers) The Ace is based on the Z80A microprocessor with 8K bytes of Rom and 3K bytes of Ram has a Spectrum-style keyboard (though it is promised to be more positive) has a proper memory-mapped screen (unlike the Spectrum) with a 32 x 24 display on an ordinary television and has sound and cassette facilities similar to those of the Spectrum but no colour It costs £89 95

If the Ace sounds like a Spectrum under a different cover it is not the Ace is set apart from the Spectrum, and all other small microcomputers by the use of the programming language Forth alone

To emphasise, you *cannot* program the Ace in Basic you *have* to use this rather different language Forth Though it is an uncommon language, many people have recently become interested in Forth, and versions have appeared *inter alia* for the Atom ZX81, MZ80K BBC computer, and there is Forth available on the latest version of the Osborne 1

For Forth to appear on the Osborne (a business machine) implies that this is a language which is beginning to make commercial sense

When confronted with a machine with higher resolution graphics and a claim from its designers that "Ace is ideal for games", the question is "why Forth and not Basic? Is Forth an easy language for beginners?"

In a way some people are afraid of Forth — a fear of the unknown? — as it seems unnatural to type th

2 5 +

when you *really* mean

2 + 5

If I ask you to add 2 and 5 you answer 7, if I ask you to take 2 and 5 and add them together you will still answer 7 When you add two numbers you are doing something to those two numbers to produce a result (another number) In Forth it is clear you are doing something to numbers, to produce another number

Forth says here are two numbers, add them together, 2 and 5 are the numbers, and + means 'add them together'

2 5 +

is not all that strange really

What is Forth? In essence Forth is a computer language which is truly interactive (almost as if it were a Basic in instant mode all the time), and it is a language which is truly extensible

In Basic it is possible to add new functions and procedures but very difficult to add new commands unless one uses machine code routines

Forth is a very efficient language, much speedier than most Basics The 8K of Rom in the Ace corresponds to a far greater amount of Rom for any Basic and the 3K of Ram is worth more than 3K of Ram if used by a Basic program

The version of Forth used by the Ace is based, loosely, on two standards FIG-Forth (Forth Interest Group) and Forth-79 but with important modifications All the modifications seem to be improvements I will examine some of them in more detail after I have looked at more general features common to most Forths

Forth is most notable for the way in which it uses basic functions (or procedures) to produce more powerful functions, so that finally the whole program (or 'application') is just one all-embracing function (or word)

Forth also uses a stack, and the user can control what happens on the stack Think of the stack as a pile of numbers, on which you can put more numbers or take numbers off but at one end only

Suppose I want to multiply two numbers together In Forth I say "here are two numbers, multiply them together"

2 5 *

and this line means take the numbers 2 and 5 multiply them together and finally print out the result (which is what the '.' means)

Forth copes with this line by starting at the left, and moving right. The first item encountered is "2" and this is recognised as a number The number 2 is stacked for later use The second item is '5 This is a number and is stacked on top of the 2 for later use When the program meets the word "*" it knows that this means multiply It multiplies the two numbers on the top of the stack (ie 2 and 5), so removes them and places the answer on top When the word "." is met it is understood to mean print the value of the number on top of the stack and remove the number

The word "." is not very self-explanatory, but in Forth if you do not like the name of a function/word you can change it, eg

: PRINT . CR ;

and now the word *"Print"* means do "." and then carriage return *("Cr")* The sum now looks like

2 5 PRINT

and it is possible to continue

It would be nice to find the square of the number 7, and it could be done by

7 7 * PRINT

or, possibly

7 DUP * PRINT



Interior layout of a pre-production model of the Jupiter Ace

where the word "*Dup*" means take the number on top of the stack (in this case 7) and put another copy on top of it (*Duplicate*). It would be nice to do this by just saying

7 SQUARED

and one can by

SQUARED DUP * PRINT

which is a 'colon' of the word "*Squared*", which definition uses a word "*PRINT*" defined earlier. And so the process can continue.

In normal Forths editing words and applications can be tedious (for reasons too tedious to explain) and the designers of the Ace had come to the same conclusion. In normal Forths it is possible to keep a copy of a definition on what is termed a 'screen', but once the definition has been compiled the internal workings cannot be changed. With the Ace there is no need to keep a separate copy of the listing of the definition — in fact one does not, in any case — and one can edit, list, and "*Redefine*" words (replace an earlier version of a word by the latest definition, and redefine any other definitions that are necessary).

Forths do not normally have floating point operations as part of the standard set of words, but the Ace has five special floating point words for use on six significant digits (1E64 to 1E-64). Ace Forth also has inbuilt array using features.

In many respects the Ace has many of the good features of the Spectrum, very good cassette saving, loading, and verifying, good line editing, good user defined graphics capabilities. As a way of using Forth, it is excellent. Apart from these resemblances, the Ace is a very different machine because it is in black and white (though a colour facility is being considered), and it can use the ZX81 16K Ram pack (plus many of the other ZX81 add-ons). An easy machine to use.

Though the machine I used was not the final production version I have no doubts about the eventual production machine. I am sure that as a Forth machine it will be excellent. I think that given my use of Forth on the Ace there are many ideas in Steve Vickers version of Forth (eg *Redefine* or *Fast* or *Edit*) which are worth incorporating in other versions.

I have found that Forth on micro-computers is not (generally speaking) user friendly — on most systems it is only too easy to find oneself in a situation where the only thing one can do is switch off and reload the Forth system. The Ace system is user-friendly, and difficult to crash.

The question of how user-friendly is the Ace is important because, being aimed, as it is, at the cheap end of the market and competing with cheaper black and white computers, and slightly more expensive colour computers, and as it uses what is a novel language, the Ace has to be user-friendly to succeed. Once one has the dictionary of words — tailored to one's own interest — to create sophisticated applications should not be as difficult as creating large programs in Basic. One word can stand for a program or a standard (often complex) facility.

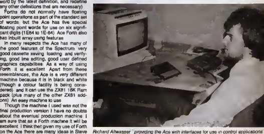
Though it is possible to merge dictionaries and applications, often this will not be necessary. As Forth itself is in Rom, if the system does crash — Steve Vickers and I had great difficulty in performing this feat — if it does crash, Forth is not lost.

For a beginner, I do not think that Forth is intrinsically any more difficult to learn than Basic, if it is approached in the right manner, but even if it is not more difficult is it any better? Altwasser and Vickers are, I believe, sincere in their belief that Forth is intrinsically a better language, and in one sense I agree. Forth is better because as we have seen it is possible (once the groundwork has been done) to perform complicated operations with a minimum of programming. Some of the quehas come with "once the groundwork has been done".

The word "*Squared*" used another word "*Print*" and another word might use them both, but "*Squared*" could not use "*Print*" until we had defined "*Print*", though with Ace Forth it is possible to give a dummy definition to "*Print*" (eg : PRINT ;) and then later use "*Redefine*" to give a proper definition. A possible problem with this approach (for novice and not so novice) is the "design at the keyboard" syndrome. That is, it is easy to get held up in the minutiae and lose sight of the overall structure. This is also a problem with most other languages, whether they be called structured or not.

I have a feeling that the Ace might well find a market as a cheap way of learning Forth (schools, colleges, and businessmen?) for some, and for others a cheap way of obtaining a machine with the speed of Forth (not far slower than poorly written machine code) for control applications. For those who would like to use the Ace for control applications, the way in which the Ace talks to the world is obviously important. The Ace talks via the television, and a rear port — the one I saw connected to the Ram pack. Richard Altwasser told me that they planned to provide means of coupling up to all the main interfaces one would need for use in control applications.

Steve Vickers puts the Jupiter Ace's keyboard through its paces



Richard Altwasser, providing the Ace with interfaces for use in control applications

Open Forum

Open Forum is for you to publish your programs and ideas. It is important that your programs are bug free before you send them in. We cannot test all of them. Contributions should be sent to: Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF

How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for DOUBLE the usual fee we pay for published programs. (The usual fee is £10.)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope.

Roman Numerals Converter

on ZX81

Roman numerals are found in the flyleaves of old books and on many old films, as well as on stones of old buildings and so on. In these contexts, they usually represent dates.

These strings of letters are often confusing and difficult to interpret. The following program interprets them for you. In addition, it will also convert any decimal number from 1 through 4999 to Roman numerals.

Program notes

Lines

```
90 LET R$="IXCMVLD"
110 LET A$=""
120 INPUT A$
130 IF A$="STOP" THEN STOP
140 SCROLL
160 PRINT A$,
160 IF A$>"A" THEN GOTO 350
170 FOR J=1 TO LEN A$
180 LET Y$=""
190 LET A=VAL A$(LEN A$-J+1)
200 IF A AND A<5 OR A=9 THEN LET
    Y$=Y$+R$(J)
210 IF A>3 THEN GOTO 280
220 LET A=A-1
230 IF A>0 THEN GOTO 200
240 LET A$=Y$+X$
250 NEXT J
260 PRINT X$
270 GOTO 100
280 IF A=9 THEN GOTO 330
290 IF J=4 THEN GOTO 220
300 LET Y$=Y$+R$(J+4)
310 LET A=A-5
320 GOTO 230
330 LET Y$=Y$+R$(J+1)
340 GOTO 240
350 IF A$<"C" THEN GOTO 100
360 LET I=1
370 LET V=5
380 LET X=10
390 LET L=50
400 LET C=100
410 LET D=500
420 LET M=1000
430 LET T=0
440 FOR J=2 TO LEN A$
450 LET B=VAL A$(J-1)
460 LET E=VAL A$(J)
470 IF E>B THEN GOTO 530
480 LET T=T+B
490 NEXT J
500 LET T=VAL A$(LEN A$)+T
510 PRINT T
520 GOTO 100
530 FOR K=J-1 TO 1 STEP -1
540 IF A$(K)<>A$(J-1) THEN GOTO 480
550 LET E=VAL A$(K)
560 LET T=T-2*E
570 NEXT K
580 GOTO 480
```

To operate this program, *Run*, and enter either

i) a decimal number (not exceeding 4999) for conversion to Roman numerals, or

ii) a Roman numeral (not exceeding MMMMCMXCIX) for conversion to decimal.

Press newline. The number you entered is displayed on the left, the conversion on the right.

ZX Artist

on ZX81

This art program gives the user all the usual things other art programs give plus the facility to draw a straight line from one given point to another, draw a circle and provide the co-ordinates for plotting.

The program also incorporates one point plotting, the ability to draw lines using the cursor keys, copy pictures on to the printer and store pictures on tape.

When the program is *Run* the user is given the choice of 10 options to choose from.

Option "0" will first ask the user for a starting point (X and Y co-ordinates) and then hand all control over to the user with the cursor keys.

Option selection

The user can leave this part of the program any time and return to the option section of the program by pressing the "9" key.

Option "1" will ask for co-ordinates and plot a single pixel on that point.

Option "2" will ask for co-ordinates and unplot a single pixel on that point.

Option "3" will ask for starting co-ordinates and finishing co-ordinates and will plot a line between them.

Option "4" will do the same as option "3" but will unplot a line between the co-ordinates.

Option "5" will ask for X and Y co-ordinates and a radius. It will then ask for how much of a circle the user wants by using the numbers 0-40. 0-10 will plot the first quarter of a circle, 10-20 the second etc. 0-20 would plot the first half of the circle.

Option "6" does the same as option "5" but unplots the circle.

Option "7" copies the border and its contents on to the printer.

Option "8" saves the program and the screen on to tape.

Option "9" stops the program.



Program notes

Lines

10-100	set up the screen
110-160	sort out the options.
200-270	provide option "0"
1000-1160	provide option "1"
2000-2610	provide option "2"
3000-3210	provide option "3"
4000-4010	provide option "4"
5000-5160	provide option "5"
6000-6010	provide option "6"
7000-7170	provide option "7"
8000-8040	save the program and screen
9000	stops the program



```
10 PRINT "      0011111222223333
444444555555"
20 PRINT "      02468024682468
0246802468"
30 PRINT
40 FOR K=18 TO 10 STEP -2
50 PRINT K;"  " TAB 31
60 NEXT K
70 PRINT "  " TAB 31
80 PRINT "  " TAB 31
90 PRINT "  " TAB 31
100 PRINT
110 PRINT AT 0,0;"INPUT OPTION
(0-8)"
120 INPUT O
130 LET O=INT O
140 IF O<0 OR O>8 THEN GOTO 100
150 IF O=0 THEN GOTO 200
160 IF O=8 THEN GOTO 3000
170 GOSUB (O*1000)
180 GOTO 110
200 GOSUB 1000
210 LET A$=INKEY$
215 PLOT X,Y
220 IF A$="5" THEN LET X=X-(X>0
)
230 IF A$="8" THEN LET X=X+(X<5
1)
240 IF A$="7" THEN LET Y=Y+(Y<3
7)
250 IF A$="6" THEN LET Y=Y-(Y>4
)
260 IF A$="0" THEN GOTO 110
270 GOTO 210
1000 PRINT AT 21,0;"INPUT ""X""
CO-ORDINATE(0-51)"
1010 INPUT X
1020 LET X=INT X
1030 IF X<0 OR X>51 THEN GOTO 10
10
1040 PRINT AT 21,0;"INPUT ""Y""
CO-ORDINATE(4-37)"
1050 INPUT Y
1060 LET Y=INT Y
1070 IF Y<4 OR Y>37 THEN GOTO 10
50
1080 IF O=1 THEN PLOT X,Y
1090 IF O=2 THEN UNPLOT X,Y
1100 RETURN
2000 GOSUB 1000
2010 RETURN
3000 GOSUB 1000
3010 PRINT AT 21,0;"INPUT ""X2""
 CO-ORDINATE(0-51)"
3020 INPUT X2
3030 LET X2=INT X2
3040 IF X2<0 OR X2>51 THEN GOTO
3020
3050 PRINT AT 21,0;"INPUT ""Y2""
 CO-ORDINATE(4-37)"
3060 INPUT Y2
3070 LET Y2=INT Y2
3080 IF Y2<4 OR Y2>37 THEN GOTO
3060
3090 LET G=0
3100 LET H=0
3110 LET X1=X2-X
3120 LET Y1=Y2-Y
3130 LET Z=ABS X1
3140 IF ABS Y1>Z THEN LET Z=ABS
Y1
3150 FOR F=1 TO Z+1
3160 IF O=3 THEN PLOT G+X,H+Y
3170 IF O=4 THEN UNPLOT G+X,H+Y
3180 LET G=G+X1/Z
3190 LET H=H+Y1/Z
3200 NEXT F
3210 RETURN
4000 GOSUB 3000
4010 RETURN
5000 GOSUB 1000
5010 PRINT AT 21,0;"INPUT RADIUS
"
5020 INPUT R
5030 PRINT AT 21,0;"INPUT CURVE
CO-ORDINATE 1(0-40)"
5040 INPUT C1
5050 IF C1<0 OR C1>39 THEN GOTO
5040
5060 PRINT AT 21,0;"INPUT CURVE
CO-ORDINATE 2(";C1;"-40)"
5070 INPUT C2
5080 IF C2<C1 OR C2>40 THEN GOTO
 5070
5090 FOR K=C1 TO C2 STEP .05
5100 LET A=K/20*PI
5110 LET XX=X+R*SIN A
5120 LET YY=Y+R*COS A
5125 IF XX<0 OR XX>51 OR YY<4 OR
 YY>37 THEN GOTO 5150
5130 IF O=5 THEN PLOT XX,YY
5140 IF O=6 THEN UNPLOT XX,YY
5150 NEXT K
5160 RETURN
6000 GOSUB 4000
6010 RETURN
7000 PRINT AT 0,0;"
7010 PRINT AT 1,0;"
7020 PRINT AT 21,0;"
7030 FOR K=2 TO 20
7040 PRINT AT K,0
7050 NEXT K
7060 COPY
7070 PRINT AT 0,5 "0011111222223
333344444455555"
7080 PRINT AT 1,0;"0246802468024
6802468024680"
7090 LET J=3
7100 FOR K=36 TO 40 STEP -2
7110 PRINT AT J,0;K
7120 LET J=J+2
7130 NEXT K
7140 PRINT AT 17,1;5
7150 PRINT AT 18,1;6
7160 PRINT AT 19,1;4
7170 RETURN
8000 LET Q$="ZX ARTIST"
8010 PRINT AT 21,0;"   ... ON TAPE
RECORDER THEN ""N/L"""
8020 PAUSE 4E4
8030 SAVE Q$
8040 RETURN
9000 STOP
```

ZX Artist
by Clive Carter

Tate Gallery

on Spectrum

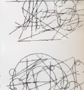
This program represents my computer's answer to the Tate Gallery. It can produce a veritable exhibition of Modern Masters each quite different and each jam packed with significance. I hope it proves that computers have soul, too.

I have used an interesting *Poke* in the program. On the ZX81 *Poke* 16510,0 gave the first line of the program the number 0. This is more difficult on the Spectrum as the program area moves about in memory. It can, however, be reproduced by the command

POKE(PEEK 23635 + 256 • PEEK 23636 + 1),0

Once a program line has been given the line number 0 it cannot be tampered with, even by accident, except by *Pokeing* it once again. It is therefore useful for copyright statements.

```
0 REM © Chris Timson 1982
5 REM
10 REM Mel 288 11
20 REM
30 REM Modern Art
40 REM
50 REM BRING BACK CITIZEN PAIN
60 REM =====================
80 RANDOMIZE
100 BORDER 0: PAPER 2: INK 7: C
LS
110 FOR n=1 TO 35
120 IF RND>.7 THEN GO TO 400
125 REM DRAW STRAIGHT LINE
130 LET a=RND*255: LET b=RND*17
5: LET c=RND*255: LET d=RND*175
140 IF RND>=.5 THEN LET c=-c: IF
 RND>.5 THEN LET d=-d
150 IF a+c>=255 OR a+c<=0 THEN
GO TO 130
160 IF b+d>=175 OR b+d<=0 THEN
GO TO 130
170 PLOT a,b: DRAW c,d
180 GO TO 500
400 REM DRAW CIRCLE
410 LET a=RND*255: LET b=RND*17
5: LET c=RND*175
420 IF a+c>=255 OR a-c<=0 THEN
GO TO 400
430 IF b+c>=175 OR b-c<=0 THEN
GO TO 400
440 CIRCLE a,b,c
500 NEXT n
510 REM PRESS ENTER TO REPEAT
520 INPUT "Beat that,Picasso "
; LINE a$
530 RUN
```



Tate Gallery
by Chris Timson

Beeps

on Spectrum

Most Spectrum owners will be aware of the *Beep* statement and its format *Beep* duration, pitch. But there is a surprising lack of use of the statement in programs published so far.

There are probably two main reasons for the absence of *Beeps*:

1. Processing stops during *Beep*
2. Lack of musical knowledge.

While it is true that in a fast-moving 'Invaders' type game *Beep* can slow things right down, there is no reason why instructions, features and finales in programs should not have a musical accompaniment.

Moon Cresta and Intro/Outro are two routines which can easily be incorporated into your programs. Moon Cresta is useful as a musical countdown to the start of a game and is similar to the arcade game tune.

Intro/Outro is a posh way of introducing a program and giving a fine musical finale. If you use these routines in a program which has other *Data* lines be sure to change the *Restore* statements to reset the data pointer to the relevant lines.

The more adventurous program Auto Arpeggio plays chord arpeggios in a way similar to Casio and Yamaha organs.

For non-musicians a chord is a group of notes played together which form the accompaniment to the melody. The most commonly used chords are the Major and the Minor which take the form

Chord		Notes	Spectrum
C Major	(C)	C E G	0 4 7
C Minor	(Cm)	C,E♭ G	0,3 7

To get C# Major add one to each number, so

C# Major	(C#)	C# F G#	1,5,8

An arpeggio is when the notes of a chord are played consecutively rather than simultaneously, producing a ripple effect.

The program stores the notes of each chord in the array C$. To make life easier when writing tunes the chord names have been assigned to the subscript values, eg Am = 1 = C$ (1).

Each string has six notes, each note is a pair of digits, so:

Am = C$ (1) = 09,16,21,24,21,16
Notes = A, E, A, C, A, E

Lines 150, 340 and 520 are the *Beep* statements. *Val* calculates the pitch of

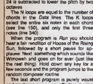
each note and on line 150, 12 is subtracted to lower the pitch one octave On line 340, 24 is subtracted to lower the pitch by two octaves

The N loops are equal to the number of chords in the *Data* lines The K loops select the entire six notes in each chord (see line 150), and only the first three notes (line 340)

When the program is *Run* you should hear a fair rendition of House of the Rising Sun, followed by a short pause for applause Next something which sounds like Wimoweh and goes on for ever (just like the real thing) Hold down any key for a few seconds and the program jumps to the random composer routine

The last short program is purely visual and produces some very effective moving displays *Run* it and watch for a while then experiment with new values for the variables on line 100

The values for s and t should always be equal to or greater than the x,y values



```
10 REM Impressive Intro/Outro
     by Ron Liberace Smith
15 REM Data is a Diminished C
     chord
[illegible]
27 REM Up
30 FOR n=-30 TO 60 STEP 3 RES
TORE
40 FOR t=1 TO 7 READ x BEEP
.08,x+n
50 NEXT t NEXT n BEEP 2,0+n-
1
60 REM Down
70 FOR n=60 TO -90 STEP -3 RE
STORE
[illegible]
110 NEXT t LET y=y+0.002 NEXT
n
[illegible]

8400 REM Moon Crest
     by Ron Smith
[illegible]

1 REM Picasso show
2 REM by Ron Smith
3 OVER 1
5 BORDER 0 PAPER 0 CLS
10 LET x=0 LET y=0 LET s=255
LET t=175
11 LET i=RND*7 LET p=RND*7: I
F i=p THEN GO TO 11
12 INK i PAPER p BORDER p
20 PLOT x,y DRAW s,0
30 PLOT x,t DRAW s,0
40 PLOT s,y DRAW 0,t
50 PLOT x,y DRAW 0,t
100 LET x=x+1 LET y=y+1 LET s
=s-1.5 LET t=t-1
105 IF x>175 OR y>175 THEN GO T
O 10
110 GO TO 20
```

Beeps
by Ron Smith

Carda

on BBC Micro

The enclosed code uses a very efficient 'sample without replacement' technique to simulate dealing a deck of cards

Call *Procmakedeck* initially and whenever you want a fresh deck. Use *Fndeal* to return the number of the next card dealt. At any time *Deck(0)* holds the number of cards left in the pack N say, and *Deck(N+1)*, *Deck(N+2)* etc is a complete history of previously-dealt cards

The algorithm can easily be adapted for other purposes such as pools coupons — simply set *Ncard* to 55 or whatever value is required and redimension *Deck* accordingly

```
10 REM INSERT FOLLOWING LINES IN MAIN PROGRAM
20 NCARD%=52
30 DIM DECK%(52)
40 REM
50 REM ..
60 REM ...
200 DEFPROCMAKEDECK
210 LOCAL I%
220 FOR I%=1 TO 52:DECK%(I%)=I%:NEXT
230 DECK%(0)=NCARD%
240 ENDPROC
250 REM
260 DEFFNDEAL
270 LOCAL N%,J%,T%
280 N%=DECK%(0):IF N%=0 THEN PROCMAKEDECK:N%=NCARD%
290 J%=RND(N%)
300 T%=DECK%(J%)
310 DECK%(J%)=DECK%(N%)
320 DECK%(N%)=T%
330 DECK%(0)=DECK%(0)-1
340 =T%
```

Cards
by David Guest

Casio

on BBC Micro

With the advent of user defined graphics on most of the new micros, there have been a number of sophisticated programs to decode binary patterns into numbers which are then used to define the shape

These progams can be useful However, I know that there are thousands of people who want to define a shape simply while in the middle of writing a program

I use either a Casio FX602P calculator with a simple binary to decimal routine or I program a function key on my BBC micro with either of these methods

If you know the method, it is easy to write a program to convert decimal to binary and back. However it is not quite so easy to do it on one line (as is needed for a function key) The reason for this is that *If Then* statements are very difficult to implement (since if the outcome is false there is no new line number to execute so the routine terminates) and the *Else* command can over-complicate things

Line 40 overcomes this problem, as the loop selects the binary digits one at a time using *Mid$*, if the digit is a one *Total=Total+(Power*1)* so the total is updated However, if the digit is a zero, *Total=Total+(Power*0)* so the total remains the same

It is useful to convert from decimal to binary as well Line 20 does this The only point to mention here is the *X?&80=* which is the same as *?(&80+X)=*

The routines are in the form of a program for convenience and should be typed in using *KEY0 LINE 20 " with the return character after the *Next* I don't think the computer tokenises key words in function keys, so use abbreviations where possible

```
[illegible]
```

BBC/Casio
by Gareth Jones

Tri-oids

on BBC Micro

This game uses less than 4K bytes of memory on the Model B so will presumably run on the Model A if a different mode is used, and if the program is modified

Tri-oids is similar to Asteroids. Although written in Basic — and therefore quite slow — the game has entertained my children and their school friends for hours during the holidays

The object of the game is to hit any of the three asteroids as many times as possible without wasting shots. Hitting an asteroid scores up to 40 points depending on how far away it is, and gives you three extra shots

For every 50 points scored an extra life is awarded. Lives are lost every time the asteroids come too close. On screen scoring is provided and so it is easy to see when to be careful. The controls are described in the program

Program notes

Lines
- 20-30 Display title
- 40-180 Instructions.
- 180 Envelope for laser
- 160 Envelope for explosions
- 170-240 Define characters for ship
- 250 Define asteroid
- 260 Dimension array for asteroid position. High score
- 270 Set mode for game, join cursors.
- 280 Define graphics and text area.
- 290 Start positions for asteroids
- 310 Set variables for new game
- 320 Move asteroids. Cursor to ship position; print ship
- 330 Check for game over
- 340 Get key pressed.
- 350 Travel in right direction
- 360 Fire laser in right direction.
- 370-380 Rotate right or left.
- 390 Hyperdrive.
- 410-540 Subroutines for new ship position
- 550-620 Subroutines for laser direction and increment.
- 640 Calculate score and check if highest.
- 650-720 Display scores etc. (game over).
- 730-760 Play again or not?
- 770-860 Increment laser position checking for hit.
- 870-960 Update score, explosion sound, move to asteroid position and flash.
- 870-960 Also get new position for hit asteroid (330).
- 970-1030 Move asteroids and check if close to ship
- 1040-1090 Decrement lives, update score, do large flash and sound
- 1140-1120 Draw or erase lines for explosions.
- 1130-1150 Print score at top of screen.

```
510RETURN
520X%=X%-20
530Y%=Y%+20
540RETURN
550x%=0:y%=0%:RETURN
560x%=0%:y%=0%:RETURN
570x%=0%:y%=0:RETURN
580x%=0%:y%=-0%:RETURN
590x%=0:y%=-0%:RETURN
600x%=-0%:y%=-0%:RETURN
610x%=-0%:y%=0:RETURN
620x%=-0%:y%=0%:RETURN
630MODE7
640H%=H%+H*50:IFH%>HS HS=H%:F=1
650IFF=1 PRINTTAB(0,6)CHR$(136);"N E W ";
660PRINT'High Score  ";HS
670PRINTTAB(14,10);CHR$(141);"Game Over.'
680PRINTTAB(14,11);CHR$(141);"Game Over.'
690PRINT''"YOU SCORED ";H%;" HITS."
700PRINT''"       WITH ";S%;" SHOTS LEFT'
710PRINT''"        AND ";L%;" LIVES LEFT."
720PRINT''"ANOTHER GAME (Y OR N)";
730A=GET:IFA=89 GOTO270:ELSEIFA<>78 GOTO730
740CLS:PRINTTAB(16,14);CHR$(141);CHR$(136);'BYE...'
750PRINTTAB(16,15);CHR$(141);CHR$(136);"BYE..."
760END
770DEFPROCLAS:J=0:P=0
780X%=X%+16:Y%=Y%-16:XX=X%:YY=Y%
790MOVEX%,Y%
800REPEATJ=J+1:X%=X%+x%:Y%=Y%+y%:IFPOINT(X%,Y%)=1THENP=J
810DRAWX%,Y%
820UNTILJ=20OR P<>0
830IFP<>0 PROCEX
840MOVEXX,YY:PLOT7,XX+J*x%,YY+J*y%:MOVEXX,YY
850X%=XX-16:Y%=YY+16
860ENDPROC
870DEFPROCEX
880H%=H%+(P*2):S%=S%+3:IFH%>49 H%=H%-50:H=H+1:L%=L%+1
```

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PROGRAM OF THE WEEK

```
 890PROCSCORE
 900SOUNDO,2,4,10:MOVEXX+P*x%,YY+P*y%
 910PROCFLASH(17,32)
 920VDU9,127,127,11,9,9,127,127,9,10
 930Q%=XX+P*x%:W%=YY+P*y%:FORV%=1TO3:IFP%(V%,0)>Q%-80 ANDP%(V%,0)<Q%+80 ANDP%(V
%,1)>W%-80 ANDP%(V%,1)<W%+80 P%(V%,0)=RND(1280):P%(V%,1)=RND(1024)
 940NEXTV%
 950PROCFLASH(3,32)
 960ENDPROC
 970DEFPROCMOOV
 980FORJ%=1TO3:MOVEP%(J%,0),P%(J%,1):VDU9,127
 990FORK%=0TO1:P%(J%,K%)=P%(J%,K%)+RND(50)-RND(50):IFP%(J%,K%)>1000 OR P%(J%,K%
)<0 P%(J%,K%)=500
 1000NEXTK%:IFP%(J%,0)>X%-30 ANDP%(J%,0)<X%+30 ANDP%(J%,1)>Y%-50 ANDP%(J%,1)<Y%+
30 PROCNUC
 1010MOVEP%(J%,0),P%(J%,1):VDU224
 1020NEXTJ%
 1030ENDPROC
 1040DEFPROCNUC:L%=L%-1
 1050PROCSCORE
 1060SOUNDO,2,6,10
 1070MOVEX%,Y%
 1080PROCFLASH(17,400):PROCFLASH(3,400)
 1090ENDPROC
 1100DEFPROCFLASH(D,L)
 1110PLOTD,0,L:PLOTO,0,-L:PLOTD,L,L:PLOTO,-L,-L:PLOTD,L,0:PLOTO,-L,0:PLOTD,L,-L:
PLOTO,-L,L:PLOTD,-L,0:PLOTO,L,0:PLOTD,-L,-L:PLOTO,L,L:PLOTD,-L,0:PLOTO,L,0:PLOTD
,-L,L:PLOTO,L,-L
 1120ENDPROC
 1130DEFPROCSCORE
 1140VDU4,30:PRINT"SCORE ";H*50+H% TAB(18);"SHOTS ";S% TAB(28);"LIVES ";L%;"  ";
VDU5
 1150ENDPROC
```

Tri-oids
by John Murphy

Pucman

on Vic 20

This program is entitled Vic Pucman and it runs on the unexpanded 3.5K Vic. The variables list is as follows:

Z — is the position of you
Q — is the position of the computer
OO — is the number of dots which have been eaten
SC — is your score
HS — is the high score
S — is the music variable
XC — is the second highest score
NA$ — is the name of the person who has the high score

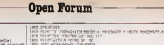
The program is based on the popular game Pucman, where a ghost chases you round a maze of dots and circles.

In my version the 'O' gives you 50 points and the '—' gives you 10 points. When the maze has been cleared your score, if bigger than the high score, is recorded.

Program notes

Lines
0-2 Set up variables
10-75 Draw the maze
90-130 Decide which way you move
151-200 Decide where computer moves
600-752 Decide whether you have crashed into the wall of the maze or not, also how much you score
900-950 Decide whether the computer has crashed into the wall or not and count the number of dots that have been eaten
1000-1050 Play a tune
1055-1210 Show the high score when the game is over and tell you that you have lost
2000-2020 Input the high scorer's name.
6000-6060 Are the instructions and titles

```
0 Z=23 Q=413 POKE36878,15 GOSUB6000 POKE650 128
1 PRINT"[illegible]" Z=23 Q=26 POKE36878 15 RESTORE SC=0 OO=0
2 POKE36879,8 PRINT"[illegible]"
5 PRINT"[illegible]"
10 PRINT"[illegible]"
20 PRINT"[illegible]"
30 PRINT"[illegible]"
40 PRINT"[illegible]"
50 PRINT"[illegible]"
60 PRINT"[illegible]"
61 PRINT"[illegible]"
62 PRINT"[illegible]"
63 PRINT"[illegible]"
64 PRINT"[illegible]"
65 PRINT"[illegible]"
66 PRINT"[illegible]"
67 PRINT"[illegible]"
68 PRINT"[illegible]"
69 PRINT"[illegible]"
70 PRINT"[illegible]"
71 PRINT"[illegible]"
72 PRINT"[illegible]"
73 PRINT"[illegible]"
74 PRINT"[illegible]"
75 PRINT"[illegible]"
80 POKE7680+Z 88
81 POKE36876 0
82 IFZ=0THENRESTORE GOTO1055
83 PRINT"[illegible]SCORE "SC
84 IFPEEK(197)=48THENPRINT"YOU QUIT!" END
85 IFOO>=195THENPRINT"[illegible]YOU'VE EATEN ALL THE PRZE " GOTO1055
90 GETU$
100 IFU$="Y"THENPOKE7680+Z 32 Z=Z-22 GOSUB600 POKE36876 241
110 IFU$="N"THENPOKE7680+Z 32 Z=Z+22 GOSUB650 POKE36876 245
120 IFU$="J"THENPOKE7680+Z 32 Z=Z+1 GOSUB700 POKE36876 135
130 IFU$="G"THENPOKE7680+Z 32 Z=Z-1 GOSUB750 POKE36876 195
151 POKE7680+Z 127
152 POKE36878 0 FORT=15TO0STEP-1 POKE36878 T NEXT
166 POKE7680+Q 65
177 IFU$="Y"THENPOKE7680+Q 32 Q=Q-22 GOSUB850
188 IFU$="N"THENPOKE7680+Q 32 Q=Q+22 GOSUB800
190 IFU$="J"THENPOKE7680+Q 32 Q=Q+1 GOSUB900
200 IFU$="G"THENPOKE7680+Q 32 Q=Q-1 GOSUB950
210 POKE7680+Q 87
```



```
490 GOTO80
495 END
600 IFPEEK(7680+Z)=102THENZ=Z+22
601 IFPEEK(7680+Z)=46THENSC=SC+10 DO=DO+1
602 IFPEEK(7680+Z)=81THENPOKE36876 195 SC=SC+50
610 RETURN
650 IFPEEK(7680+Z)=102THENZ=Z-22
651 IFPEEK(7680+Z)=46THENSC=SC+10 DO=DO+1
652 IFPEEK(7680-Z)=81THENPOKE36876 195 SC=SC+50
660 RETURN
700 IFPEEK(7680+Z)=102THENZ=Z-1
701 IFPEEK(7680+Z)=46THENSC=SC+10 DO=DO+1
702 IFPEEK(7680-Z)=81THENPOKE36876 195 SC=SC+50
710 RETURN
750 IFPEEK(7680+Z)=102THENZ=Z+1
751 IFPEEK(7680+Z)=46THENSC=SC+10 DO=DO+1
752 IFPEEK(7680-Z)=81THENPOKE36876 195 SC=SC+50
760 RETURN
800 IFPEEK(7680+Q)=102THENQ=Q+22
801 IFPEEK(7680+Q)=46THENDO=DO+1
810 RETURN
850 IFPEEK(7680+Q)=102THENQ=Q+22
851 IFPEEK(7680+Q)=46THENDO=DO+1
860 RETURN
900 IFPEEK(7680+Q)=102THENQ=Q-1
901 IFPEEK(7680+Q)=46THENDO=DO+1
910 RETURN
950 IFPEEK(7680+Q)=102THENQ=Q+1
951 IFPEEK(7680+Q)=46THENDO=DO+1
960 RETURN
1000 READS
1001 IFS=-23ORS=-21ORS=-22ORS=-1ORS=0ORS
     =1ORS=22ORS=23ORS=22THENS=287
1002 DATA215 215 225-225,225 215 221 231 231 231 231 231 232,228 228 228,231 225
,225
1003 DATA225 228,219 219,219 219,223,215,215,215 215 225 223 225 225 215,215 231
,231
1004 DATA231 231 231-235,228 228,228 221 225 225 225,228 219,223,215,225,225 6
1011 IFS=6 THENPOKE36876 0 POKE36874 0 RETURN
1020 POKE36876 S POKE36874 S
1030 FORV8=1TO100 NEXTV8
1031 POKE36875 0 FORT=0TO15STEP+1 POKE36878,T NEXT
1040 IFB=-1THENPOKE36876 0 GOTO1060
1050 GOTO1000
1055 GOSUB1000
1060 PRINT"" FORK=241TO135STEP-1 POKE36877 K NEXTK POKE36877,0
1070 PRINT"THE MONSTER GOT YOU !!"
1080 PRINT"WITH A SCORE OF "SC
1090 IFSC>HSTHENHS=SC GOSUB2000
1100 PRINT" KEY" GETX$ IFX$=""THEN1100
1110 PRINT""
1111 IFSC>XCANDHS<>SCTHENXC=SC
1112 PRINT"THE HIGH SCORE TODAY= "HS" IT WAS GOT BY "N$
1120 PRINT"THE SECOND HIGHEST SCORE WAS "XC
1150 FORL=1TO1000 NEXTL
1160 PRINT""
1170 PRINT"PRESS S TO RESTART"
1180 FOR =1TO1000 NEXTL
1190 GETL$
1200 IFL$="S"THENGOTO1
1210 PRINT"" GOTO1112
2000 PRINT"YOUR SCORE IS THE BEST TO DAY ENTER NAME"
2010 INPUTN$
2020 RETURN
6000 PRINT "                PUCMAN                "
6001 GOSUB1000
6002 PRINT THE KEYBOARD VERSION"
6010 PRINTTAB(3                                  SOFTWARE
"
6030 PRINT"HIT DOTS FOR POINTS   YOU ARE THE'@'"
6040 PRINT"AVOID THE MOVING'@'"
6045 PRINT"USE / UP H DOWN J    RIGHT 0 LEFT"
6046 PRINT"Q TO QUIT THE GAME
6050 PRINT KEY" GETR$ IFR$=""THEN6050
6060 RETURN
```

Pucman
by Nicholas Webster

Programming

Automatic relocation subroutine

***Malcolm Paltz** presents a relocation program for the expanded Vic20.*

This subroutine (Fig 1) will allow a program on Vic20, with 8K or more expansion, to relocate itself automatically beyond the user defined character set. The subroutine is self-contained

Line 10 checks to see if the program has already been relocated or if it has any expansion memory in which to relocate. If the program has already been relocated it will not repeat the process. Lines 20-40 work out the last address of the program, while line 50 uses this last address to test whether or not there is sufficient memory available to relocate the program.

Lines 60-70 then move the program backwards, to avoid overwriting itself.

Lines 80-120 re-adjust the links used by Vic Basic and determine where the variables may start. Lines 130-160 *Poke* these values into the appropriate locations and set the new start of Basic.

Line 170 then runs the relocated program, which starts at line 200. This time the test at line 10 will be true and the *Goto* taken. Line 170 could read RUN 200 if you wish.

```
READY.

 1 PRINT"[illegible]PLEASE WAIT!!"
 5 POKE56,30:POKE52,30:POKE644,30:POKE44,16
 6 POKE642,16:POKE4096,0:CLR
 10 FORI=7680TO8191:POKEI,32:POKEI+30720,1:NEXT
 20 POKE210,30:FORI=217TO228:POKEI,158:NEXT
 30 POKE229,159:POKE230,159:POKE231,31
 40 FORI=232TO240:POKEI,159:NEXT
 50 POKE244,151:POKE648,30
 60 POKE36869,240:POKE36866,150
 70 END
READY.

READY.
```

Fig 2

```
10 IFPEEK(44)=36ORPEEK(56)=32THEN200
20 A=PEEK(43)+256*PEEK(44):LO=A
30 IFPEEK(A)=0ANDPEEK(A+1)=0THEN50
40 A=PEEK(A)+256*PEEK(A+1):GOTO30
50 HI=A+1:IFHI+4609>PEEK(55)+256*PEEK(56)THEN
PRINT"NOT ENOUGH ROOM TO MOVE THIS PROGRAM":END
60 FORA=HI+1TOLO-1STEP-1
70 POKEA+4608,PEEK(A):NEXT:A=LO
80 IFPEEK(A+4608)=0ANDPEEK(A+4609)=0THEN120
90 POKEA+4609,PEEK(A+4609)+18
100 X=PEEK(A+4608):Y=PEEK(A+4609)
110 A=PEEK(A+4608)+256*(PEEK(A+4609)-18):GOTO80
120 X=X+2:IFX>255THENX=X-255:Y=Y+1
130 POKE47,X:POKE48,Y
140 POKE49,X:POKE50,Y
150 POKE45,X:POKE46,Y
160 POKE43,1:POKE44,36
170 RUN
200
```

Fig 1

Contact wear problem solved

***J S and J C Dale** explain how to run machine code games on an expanded Vic20.*

After buying an expansion unit and a 16K Ram pack for my Vic, I was very disappointed when I found that I could no longer run my machine code games. The only way to run these games was to remove the Ram pack, but this wears down the contacts.

Under great pressure from my children, my eldest son and I, armed with Nick Hampshire's excellent book *The Vic Revealed*, set about solving this problem. The accompanying listing (Fig 2) is the result.

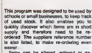
Before any game written for an unexpanded Vic is loaded, this program should be loaded and run. The relevant program may then be loaded and run without removing the Ram pack.

If you want to write a program immediately after running the conversion program, type in *New* before starting. Otherwise a *Syntax error* will result.

Important — After using the unexpanded program ensure that you reset the Vic by typing *SYS64802* then press *return*

Spectrum

In this new slot various contributors explore different aspects of the ZX Spectrum.



Tracking down the missing supplies

J Reynolds stock control program keeps track of your business.

This program was designed to be used by schools or small businesses, to keep track of used stock. It also enables you to quickly discover which items are in short supply and therefore need to be re-ordered. The suppliers reference number is also listed, to make re-ordering even easier.

Items can be altered, entered or deleted at will, as there is a comprehensive selection. After being entered, stock items can be altered as they are used by inputting the number of items used preceded by a minus sign.

A copy of the current stock position or of the items that need to be re-ordered can be obtained with a printer using *Copy*. When a list is required of the final few items ie not a complete screenful, just press *Break* followed by *Cls* and *Cont*.

On the 16K Spectrum this program will hold 125 separate items. If more items are required, you can use separate tapes for different types of stock. For example, stationery could be kept on one tape and painting materials on another. Sasco Slot-index panels can be used to keep day to day track of stock levels so that information in the computer can be updated at weekly or monthly intervals.

In the event of any problems *Goto* 1000 will obtain the menu selection, so avoiding the loss of any variables which have been inputted.

Program notes

Line 10 sets up the arrays.
1010-1090 Menu selection.
1100-1160 This is the area of the programme dealing with the selection.
2000-2110 This part deals with alteration to the stock levels.
3000-3040 Enters the stock.
4000-4070 Lists the stock.
5000-5040 Lists items to be re-ordered.
6000 Saves and verifies.
7000-7030 Deletes items.

```
   1 REM STOCK CONTROL
  10 DIM r$(100,12): DIM s(100): DIM x(100): DIM y$(100,8)
  20 LET a=0: LET l=2
  30 BORDER 0: PAPER 2: INK 7: CLS
  40 GO SUB 9000
1000 BORDER 0: PAPER 2: INK 7: CLS
1010 PRINT AT 4,8;"*****MENU*****"
1020 PRINT AT 6,2;"Key A to Alter Stock on List"
1030 PRINT AT 8,2;"Key D to Delete Item"
1040 PRINT AT 10,2;"Key E to Enter Stock on List"
1050 PRINT AT 12,2;"Key L for Present Stock Levels"
1060 PRINT AT 14,1;"Key R for Items to be Reordered"
1070 PRINT AT 16,2;"Key S to Save Stock List"
1080 PRINT AT 18,0;"****************"
1090 PRINT AT 21,0: INPUT "Input Selection ";a$
1100 CLS
1110 IF a$="e" THEN GO TO 3000
1120 IF a$="l" THEN GO TO 4000
1130 IF a$="r" THEN GO TO 5000
1140 IF a$="s" THEN GO TO 6000
1150 IF a$="d" THEN GO TO 7000
1160 IF a$="a" THEN GO TO 2000
1170 GO TO 1000
2000 LET c=1: CLS
2010 PRINT AT 21,0;"Input code number to be altered": INPUT b
2020 PRINT AT 21,0;"
2030 LET c=c+1: PRINT AT 0,0;"ST.";TAB 3;"Stock Item";TAB 15;"ST.";TAB 20;"Low";TAB 24;"Re-Or";AT 1,0;"No.";TAB 15;"Lev.";TAB 20;"Lev.";TAB 24;"Number"
2040 FOR z=1 TO a: IF z=b THEN INK 0: PRINT AT 21,0;z;TAB 3;r$(z,1 TO 12);TAB 15;s(z);TAB 20;x(z);TAB 23;y$(z)
2050 NEXT z
2060 INPUT g: LET s(b)=s(b)+g
2070 PRINT AT c+1,0;b;TAB 3;r$(b,1 TO 12);TAB 15;s(b);TAB 20;x(b);TAB 23;y$(b)
2080 PRINT INK 5;AT 21,0;"Key BREAK for next item or M"
2090 IF INKEY$="m" THEN GO TO 1000
2100 IF INKEY$<>"" THEN BEEP .1,3: PRINT AT 21,0; INK 9;"Key BREAK for next item or M": BEEP .1,0: GO TO 2080
2110 GO TO 2010
3000 PRINT AT 0,0;"ST.";TAB 3;"Stock Item";TAB 15;"ST.";TAB 20;"Low";TAB 24;"Re-Or";AT 1,0;"No.";TAB 15;"Lev.";TAB 20;"Lev.";TAB 24;"Number"
3010 INPUT b$: BEEP .1,2: LET a=a+1: LET r$(a,1 TO 12)=b$
3020 INPUT b: BEEP .1,2: LET s(a)=b: INPUT c: BEEP .1,1: LET x(a)=c: INPUT d$: BEEP .1,2: LET y$(a)=d$
3030 PRINT AT l,0;a;TAB 3;b$;TAB 15;b;TAB 20;c;TAB 23;d$: PRINT AT 21,0; INK 0;"Key NEWLINE for next item or M": BEEP .5,0: PRINT INK 5;AT 21,0;"Key NEWLINE for next input or M": BEEP .5,1: INPUT a$: IF a$="m" THEN GO TO 1000
3035 IF a$<>"" THEN GO TO 3030
3040 PRINT INK 7;AT 21,0;"                    ": LET l=l+1: GO TO 3010
4000 PRINT AT 0,0;"ST.";TAB 3;"Stock Item";TAB 15;"ST.";TAB 20;"Low";TAB 24;"Re-Or";AT 1,0;"No.";TAB 15;"Lev.";TAB 20;"Lev.";TAB 24;"Number"
4010 FOR z=1 TO a: IF r$(z,1 TO 12)="            " THEN GO TO 4040
4020 PRINT z;TAB 3;r$(z,1 TO 12);TAB 15;s(z);TAB 20;x(z);TAB 24;y$(z): NEXT z
4040 NEXT z
4050 PRINT INK 5;AT 21,0;"Press M for MENU": IF INKEY$="m" THEN GO TO 1000
4060 IF INKEY$="z" THEN COPY
4070 GO TO 4050
5000 PRINT AT 0,0;"ST.";TAB 3;"Stock Item";TAB 15;"ST.";TAB 20;"Low";TAB 24;"Re-Or";AT 1,0;"No.";TAB 15;"Lev.";TAB 20;"Lev.";TAB 24;"Number"
5010 FOR z=1 TO a
5020 IF s(z)<x(z) THEN PRINT z;TAB 3;r$(z,1 TO 12);TAB 15;s(z);TAB 20;x(z);TAB 23;y$(z): NEXT z
5030 NEXT z
5035 INPUT u$
5040 GO TO 1000
6000 CLS: PRINT AT 21,0: INPUT "Name of file ";a$: SAVE a$: PRINT AT 21,0;"Finished saving.Press any key to verify file": INPUT l$: VERIFY a$: PRINT AT 21,0;"Verifyed": INPUT l$: GO TO 1000
7000 CLS: PRINT AT 21,2;"Input code number to be erased": INPUT p
7010 FOR q=1 TO a: IF q=p THEN GO TO 7030
7020 NEXT q: PRINT AT 21,0; INK 5;"Code ";p;" not on file": INPUT a$: GO TO 1000
7030 LET r$(q)=r$(q+1): LET s(q)=s(q+1): LET x(q)=x(q+1): LET y$(q)=y$(q+1): PRINT AT 21,0; INK 5;"Item deleted.Press enter": INPUT a$: GO TO 1000
9000 PRINT INK 5;TAB 8;"Stock Control";TAB 8;"*************"
9010 PRINT : PRINT INK 7;TAB 8;"BY J.REYNOLDS"
9020 PRINT : PRINT TAB 2;"To use this program properly every time the DATA is changed you should re-record the program.When the saving has finished the program begins to verify"
9030 PRINT TAB 5;"When you later load the program it should print the menu.If it does not then start the program by GOTO 1000 not run"
9040 PRINT AT 21,0;"Press any key to begin": IF INKEY$="" THEN GO TO 9040
9050 RETURN
```

This program was written for the BBC micro, model A or B, and plays the musical game of *Simon*. The object of the game is to repeat the ever-increasing sequence of lights and tones by using the four cursor keys which correspond to the computer's coloured squares.

If you manage to reach your inputted skill level the computer will reward you with a warbling sound. Any mistakes and the game will end.

The program consists mainly of two *For-next* loops. The Y loop (line 200) controls the point in the sequence that you have successfully repeated. The X loop is used twice (line 210 and line 290) and runs from the beginning of the sequence to Y, controlling which light and tone is to be made. The pattern of the lights in the sequence is stored in the A array which is dimensioned (line 170) to store as many lights as the skill level you had previously entered.

The lighting up effect is made by changing the appropriate colour, determined by the number (1-4) in the array, to white and then back to its original colour, by the use of the *Vdu* 19 command (lines 230,260,390 and 420). The *Fx* 4,2 command enables the cursor keys to be detected by an *Inkey* statement and the *Fx* 15,0 command clears the sound buffer.

One useful procedure is the *Procwait(t)* one, which pauses for T milliseconds. I managed to reach a score of 14 — can anyone beat that?



Simon says . . .

***L Raynor** presents Simon, a musical game for the BBC model A or B.*

```
10 REM*** SIMON BY L.M. RAYNER *
20 REM**  FOR B C MICRO  ODEL A OR B * *
30 MODE 7
40 FOR X=1 TO 2:PRINTCHR$(141)CHR$(129)"          SIMON":NEXT X
50 PRINT''
60 PRINT CHR$(13 )"  REPEAT MY SEQUENCE OF SOUNOS ANO"
70 PRINTCHR$(13 )"COLCURS BY USING THE FOUR CURSOR KEYS"
80 PRINTCHR$(134)"WHICH CORRESPUND TO MY FOUR SQUARES."
90 INPUT"     SKILL? (10-30) "Z
100 IF Z<10 OR Z>30 THEN 90
110 *FX 4,2
120 MODE 5
130 FOR X=0 TO 3:VDU 19,X, +1,0,0,0:NEXT X
140 GCOL0,1:MOVE 640,512:MOVE 0,512:PLOT85,640,1 24:PLOT 85,0,1024
150 GCOL0,2:MOVE 640,512:MOVE 640,1024:PLOT 85,1280,512:PLOT 85,1280,
    1024
160 GCOL0,3:MOVE 640,512:MOVE 640,0:PLOT 85,1280,512:PLOT 85,1280,0
170 DIM A(Z)
180 FOR X=1 TO Z:A(X)=RND(4)-1:
    NEXT
190 PROCWAIT(100)
200 FOR Y=1 TO Z
210 FOR X=1 TO Y
220 SOUNO 1,-15,A(X)*20,30
230 VDU 19,A(X),7,0,0,0
240 PROCWAIT(50)
250 *FX 15,0
260 VDU 19,A(X),A(X)+1,0  ,0
270 PROCWAIT(50)
280 NEXT X
290 FOR X=1 TO Y
300 A$=GET$
310 A=9
320 IF A$=CHR$(139) THEN A=0
330 IF A$=CHR$(136) THEN A=1
340 IF A$=CHR$(137) THEN A=2
350 IF A$=CHR$(138) THEN A=3
360 IF A=9 THEN 30
370 IF A(X)<>A THEN SOUNO 1,-15,1,
    30:GOTO 510
380 SOUNO 1,- 5,A(X)*20,30
390 VDU 19,A(X),7,0,0,
400 PROCWAIT(50)
410 *FX 15,0
420 VDU 19,A(X),A(X)+1,0 0,
430 PROCWAIT(50)
440 NEXT X
450 PROCWAIT(120)
460 NEXT Y
470 FOR R=1 TO 20
480 SOUND 1,-15,150,2
490 SOUND 1,-15,40,2
500 NEXT R
510 COLCUR 2:PRINT TAB(5,10)
    "SCORE=";Y-1
520 PRINT''"PRES  SPACE TO START"
530 A$=GET$:RUN
540 DEFPROCWAIT(T)
550 TIME=0
560 REPEAT UNTIL TIME=T
570 ENDPROC
```

Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

ABOMINABLE CURSORS

K V Jefferies of East Walk, Croydon Road, Reigate, writes

Q After using my ZX81 for seven months I am having difficulty in switching from 'K' cursor to 'F' cursor. With the *Shift* key depressed, pressure on *New line* does not immediately produce the Function cursor. Is there any simple solution?

I was thinking of buying a Kempston keyboard. Will this solve the problem, or will it be a waste of money, if the much sensitive system is faulty?

A I have a big sticker on my ZX81 '*New line* worn. Roll the finger over the key to make contact.' As your machine is within the guarantee period, in theory you should send it back. If you do, test it as soon as Sinclair return it to you. If there is no improvement send it back on the same day, with a stiff covering letter.

Some people who have bad experience of the Sinclair returns department would advise you very strongly against doing this if you want to see your machine back in anything like a reasonable time.

There is not a lot of evidence of ZX81 keyboards giving out, so this case should be seen in isolation. If the keyboard is at fault, then another keyboard should bypass the problem.

The only exception would be if one of the diodes had become damaged in some way, preventing it from discharging power at the right time. This is however very unlikely.

EACH ONE TO HIS TASTE

Michael Andrews of South East London, writes

Q I have just been given a Texas Instruments 99/4 computer for a birthday present. Could you please tell me if there are any books or magazines published for this computer, or if there is a user's club? It seems that it is not a very popular computer and does not have much support.

A I do not know about horses, but perhaps you are looking a gift computer a little in the mouth. Think of all those BBC and Sinclair customers who have been waiting literally months for computers that still have not been delivered. While the TI 99/4 might not be well supported, it is not without admirers. It has a home users group who should be able to give you the sort of information you need. Write to Paul Dicks, TIHOME, 157 Bedford Road, Morden, Surrey.

COMMANDING PROBLEMS

Stephen Clements of Hophurst Drive, Crawley Down, West Sussex, writes

Q I am writing to ask if you could help me out with a problem I have been agonising over for the past few weeks. I have been converting programs for the ZX81 to be used on my Vic, but I have come face to face with a line *Print at* x,y; which I do not know how to convert. Can you help me?

A One of the major disadvantages of the ZX81 is that it does not have a memory mapped screen. Therefore you cannot *Poke* characters on to the display, though you can use the *Print at* command. *Print* at x,y, "*" would mean that at line x, column y, the character * would appear.

But the ZX81 can *Print at* more screen locations than the Vic20 can *Poke*. This is because the ZX81 uses a 22 line × 32 column grid, whereas the Vic uses a 24 line × 22 column grid.

The control of characters will have to be different, because a location defined by a *Print at* command is not mapped into a specific place in the memory. Such a location will float in the Ram, without a permanent address that can be *Peeked* or *Poked*.

Horizontal locations are determined by adding or subtracting from y, while vertical locations are determined by adding or subtracting from x. A simple routine to show this would be:

```
10 LET X=10
20 LET Y=10
30 PRINT AT X,Y "*"
40 IF NOT INKEY$="" THEN PRINT
   AT X,Y "  " & space
50 IF INKEY$="5" THEN LET
   Y=Y-1
60 IF INKEY$="6" THEN LET
   X=X+1
70 IF INKEY$="7" THEN LET
   X=X-1
80 IF INKEY$="8" THEN LET
   Y=V+1
90 GOTO 30
```

PACKAGING MEMORIES

M Ellick of Burrington Close, Bristol, writes

Q I have a ZX81 with a 64K Ram Pack fitted. In a letter in your July 1 issue, you mention that the ZX Microdrive will probably be able to be used with other computers, like the ZX printer. Do you think that an adaptor will be needed to use the Microdrive with the ZX81?

A Until someone actually sees the Microdrive we cannot be sure how easy it will be to use with the ZX81. However, the ZX81 does not have the disc control commands in its Rom, so some sort of extra control will be necessary. My guess is that this will take the form of an Eprom accessible by *Poke* commands. This means that you will have to switch out another block of your memory pack to make way for the Eprom. But, this would still allow you to write a 48K program, with a database stored on the Microdrive.

SWITCHING BLACK AND WHITE

Imtiaz Mirza of Priory Avenue, High Wycombe, Buckinghamshire, writes

Q I read in *PCW* July 8 that it was not possible to modify the ZX81 hardware to change the black characters on a white background to white characters on a black background. You said that this was only possible on the ZX80. Could you please advise me on how to do this?

A The modification on the ZX80 to give inverse video is a simple wiring job. On the underside of the pcb are three letters A, B and C. Normally the track runs from A to C. A simple wire bridge between A and B, instead of A and C, will do the job. If you want to get really clever, you could always wire in a switch so that you could change between an ordinary and inverse display.

D Fritsch, of 6 Stanton Road, Felwall, Warrington, Cheshire WA4 2HS, makes an add on that will give you an inverse display on the ZX81.

HOODWINKING KEYWORD MEMORY

Alan Hapgood of Fulham, London, writes

Q I know that if I want to use a keyword on my Vic20, I can enter it by using the first letter, followed by the second letter shifted. What I would like to know is why this is so?

A This useful feature on the Vic is due to the operating system which uses text compression. All the keywords on a Vic are stored as a number between 0 and 255. If you write *Input* on to the screen, it will be stored there as five bytes, and will therefore take up five bytes of screen memory. But it will leave the buffer as a single byte with a decimal value of 132. Whatever the number of bytes of screen memory the keyword takes, it will still only be stored as a single byte.

When you use an I shift N for *Input* you are fooling the computer into thinking that you have entered the full command. This only uses two bytes of screen memory. If you *List* the instruction, it will come up as *Input*, because the process is reversed as information comes back to the screen out of the buffer.

Classified

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WANTED ZX81 1K for learning computer programming cheaply. Bill Clark, 1 Lumsic Loan, Kennoway, Fife

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Competitions

Finding the lady

A B C

Three playing cards are placed face down on a table The total value of A and B is 15 The total value of B and C is 17 No card is a seven or has a value higher than 9 Identify the cards

This problem can be solved using a simple program

```
10 FOR A = 1 TO 9
20 LET B = 15 - A
30 LET C = 17 - B
40 IF A = 7 OR A > 9 OR B = 7 OR B > 9 OR C = 7
   OR C > 9 THEN GOTO 60
50 PRINT "A = ",A "B = "B "C = "C
60 NEXT A
```

Even without a computer this is not a difficult problem but the same approach will apply to more complex problems

Now try this card trick Deal 20 cards off a shuffled pack and ask a friend to insert the cards back into the pack but the other way up from the rest of the pack (face up rather than face down) Shuffle the pack and get your friend to count off the top 20 cards straightening the pile so that you cannot see which way they face Ask your friend to note, without telling you, the number of cards face-up in the remaining 32 cards

Hold the 20 cards behind your back and — by thought transference — you will be able to turn individual cards over so that the number of cards face-up in your part of the pack is the same as the number face-up in your friend's 32 cards.

When the two piles of cards are investigated, they will be found to have the same number of cards face-up

How is it done? When you hold the cards behind your back you simply turn them over

The whole pack contains 52 cards of which 20 have been turned over If your friend has a number of cards, p, turned over in his pile of 32 cards then you have $20 - p$ reversed cards in yours Since there are 20 cards in all in your pile then you must have p cards face down Turn the whole pile over and you have the same number of cards face-up as your friend

Puzzle No 21

Take a pack of cards and perform a perfect 'riffle shuffle' In such a perfect shuffle the pack is divided exactly in half Each half is then held at one end while the other ends are flicked together so that the cards become perfectly interleaved

Repeat the shuffle a number of times Each time ensure that the first card to fall is from the top half of the pack that was formerly on the top of the pack — thus making sure that the top and bottom cards are always changing Continue shuffling until the pack is brought back to its order at the start.

How many times must the shuffle be performed if (a) a standard pack of 52 cards is used and (b) if the jokers are added to make a pack of 54 cards?

Solution to Puzzle No 17

First find the length of the sides of a non right-angle triangle where the area is 180 sq miles and the sides are exact numbers of miles in length This can be done using a program similar to the one below

```
10 LET L = 10
20 FOR A = L - 9 TO L
30 FOR B = 2 TO A - 1
40 FOR C = (A - B) + 1 TO B - 1
50 LET S = (A + B + C)/2
60 LET T = SQR (S * (S - A) * (S - B) * (S - C))
70 IF ABS (T - 180) < 0.000001 AND B * B + C *
   C < > A * A THEN GOTO 200
80 NEXT C
90 NEXT B
100 NEXT A
110 LET L = L + 10
120 GOTO 20
200 PRINT A," ",B," ",C
210 STOP
```

This gives the sides as 37, 30 and 13 miles The catch was in the words 'the morning's total divided by half' — meaning multiplied by two In this case the distance from A to B could only be 13 miles — covered in the morning — with 26 miles covered in the afternoon With a total round trip of 80 miles, this leaves 41 miles still to be travelled at finish the journey

Winner of Puzzle No 17

The winner is P M Hill Westcott Close Frome Somerset who receives £10

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Leading computer Designers Richard Altwasser and Steven Vickers have a reputation for pushing technology forwards After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace

Technical Specification

Hardware

Processor/Memory
Z80A running at 3 25 MHz
8K bytes ROM 3K bytes RAM

Input
40 moving-key keyboard with auto-repeat on every key

Output
Memory-mapped 32 x 24 character display with high resolution user graphics Output to drive normal UHF TV set on channel 36

Sound
Provided by internal loudspeaker

Cassette
Load Save & Verify at 1500 baud separate data storage

Software FORTH

Data Structures
Integer Floating point and String data may be held as constants variables or arrays with multiple dimensions and mixed data types

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